

サービス情報

TECHNICAL INFORMATION

2013/8/2
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件 名	DE-18機関 取扱説明書改訂(デフレクション計測)について
SUBJECT	DE-18 Revision of operation manual for crankshaft deflection measurement
適 用 機 種	DE-18
ENGINE MODEL	

内 容

DE-18機関のクランク軸デフレクション計測において、従来通りクランクアーム端部に計測器をセットし計測のところ、連接棒大端部が計測器に接触し、計測器が落下し易いとの事から、容易にデフレクション計測を行う為に、2012年11月より以下のとおり取扱説明書を改訂しましたのでご連絡致します。

<改訂内容>

- ①デフレクション計測時の、ゲージ取付け位置を、クランクアーム部からバランスウェイト上に変更。
- ②計測位置の変更により、調整値・修正限度値を計算する場合、『計測点修正係数： α 』を乗じて計算する。（下図バランスウェイト端面より、98mmの位置で計測した場合）

※計測点修正係数 $\alpha = 1.23$ とする。

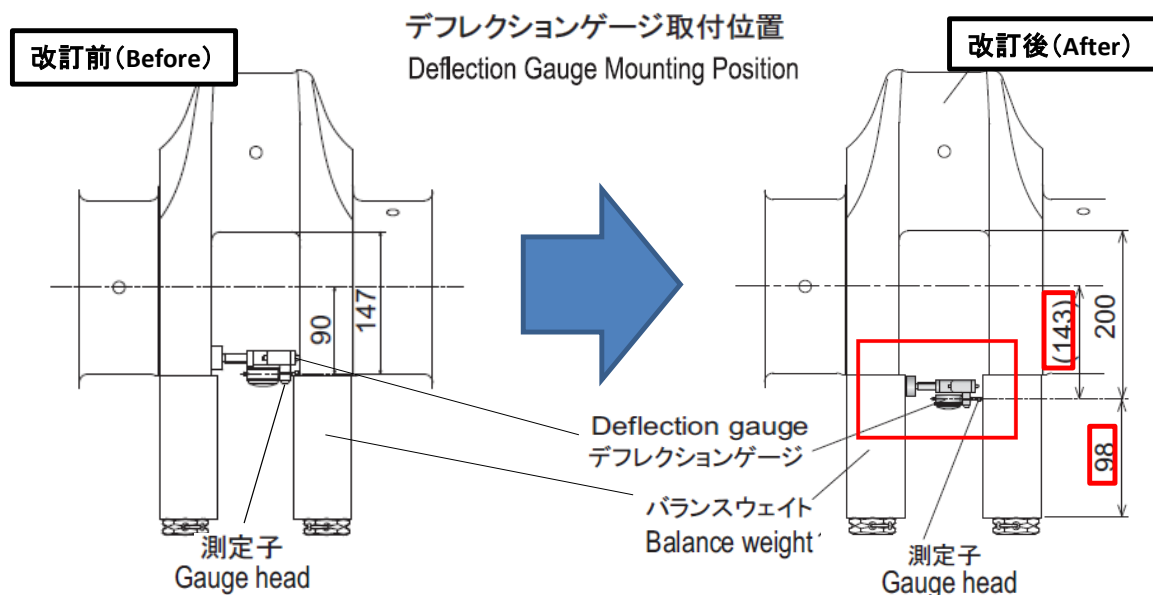
改訂前及び改訂後の取扱説明書（抜粋）を添付致しますので、ご確認お願い致します。

NOTE

When carrying out the deflection on DE-18 engine it was found that the connecting rod big end was coming in contact with the deflection gauge at one position. In order to get more positive and easy reading without dropping of the deflection gauge, there was some amendments that we carried out in the Manuals from Nov 2012. The revised contents is as follows

<Revised contents>

- ①The position at which the deflection gauge is mounted is changed from crankshaft web to the crankshaft balance weight.
 - ②Because of change in position of the measuring point an adjustment value or correction factor has to be taken into account (multiplied) when calculating the deflection. (Correction Factor : α)
- ※Measurement point correction factor $\alpha = 1.23$
 (When the deflection gauge measures 98mm as shown figure from the balance weight end face)
 We herewith attach the before manual and the revised manual page for your kind reference.



CHAPTER	5	Inspection and Maintenance
ITEM	4.6 DE-18	Inspection and Maintenance: Measuring Crankshaft Deflection

5-4.6 Measuring Crankshaft Deflection



If the crankshaft deflection exceeds its limit, the stress to be applied to the crankshaft becomes excessive, and it results in the breakage of crankshaft if the excess of deflection is too large.

Therefore, adjust the crankshaft deflection to the proper value when being installed, and periodically measure the deflection, so that it can be corrected whenever it is over the limit value.

A. Replacing Consumables and Measuring Instruments

a. Replacing Consumables

(: "Parts List")

1. O-ring (frame side cover) 2-2 No.3

b. Implements and Measuring Instruments

1. General tools

(: "Implement List" in the final documents)

2. Deflection gauge
3. Mirror

B. Conditions for Measuring Deflection

- Deflection of the crankshaft varies according to the temperature. Be sure to measure it when the engine is in cold state.
- Before measurement, push the contact piece of the deflection gauge with a finger, and confirm that both the contact piece and dial gauge return to the original positions correctly.
- In the case of the marine engine, since the deflection varies according to the loaded cargo conditions, be minded to record the conditions of loaded cargo, draft, temperature, and so on, at the same time.

C. Measuring Deflection

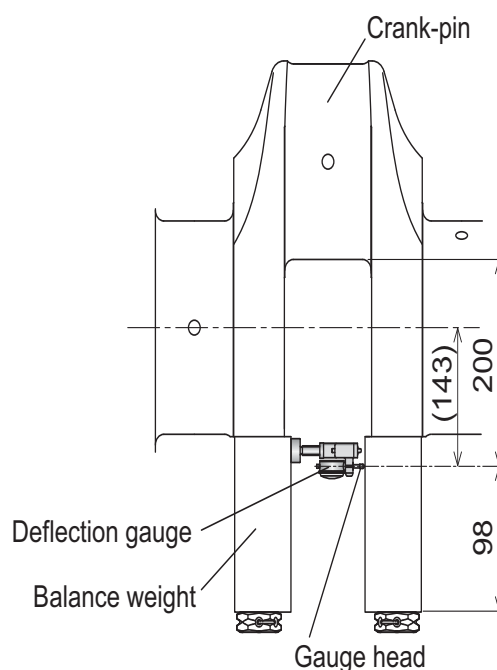
<Measurement procedure>

- Open the indicator valve, and perform turning the crankshaft.
- Place the crank pin at the point of 30° (position "B") past the bottom dead center.
- Mount the deflection gauge as shown in the figure (Deflection Gauge Mounting Position).



Be careful not to interfere with the threaded connecting rod bolt during turning the crankshaft.

- Set the reading on the gauge scale to +20 at the position "B" in the Figure. (To make clear the positive and negative directions.)
- Slowly turn the engine in the normal direction of rotation, and measure the reading on the scale when the crankshaft is at the angle of "B", "C", "D", "E", and "A" respectively, of which data shall be recorded.



Deflection Gauge Mounting Position

Inspection and Maintenance

Inspection and Maintenance:
Measuring Crankshaft Deflection

DE-18

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D. Calculating Deflection (d)

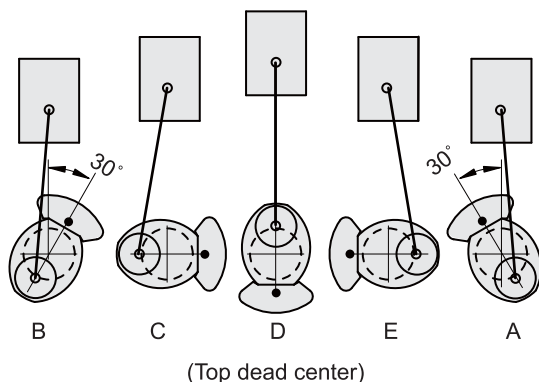
Calculate the deflection values as based on the measured values in accordance with the following formula, record the calculated values

- Vertical (V) deflection : $dV = D - \frac{A+B}{2}$

- Horizontal (H) deflection : $dH = C - E$

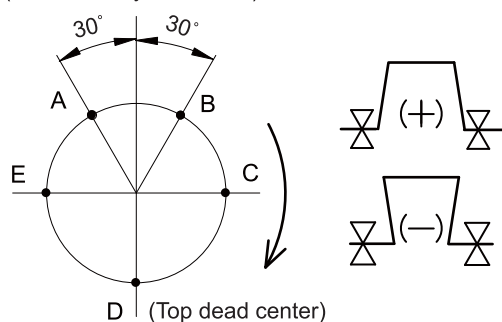
- Positive/negative deflection: Open downward (+), closing downward (-)

A, B, C, D, and E represent the measured values respectively at each corresponding position shown in the figure on the right.



Deflection Measuring Position

(Seen from flywheel side)



Dial Gauge Reading

E. Correction Limit for Deflection

- a. The correction limit shall apply to whichever is larger of dV and dH as shown in the following table.

(Unit: mm)

	Adjusted value	Allowable limit	Direction
In case of direct connection: (One-side bearing generator)	0.034 or less	0.096	
	$\frac{1}{10,000} \times \text{stroke} \times \alpha$	$\frac{2.8}{10,000} \times \text{stroke} \times \alpha$	
In case of direct connection: (Both-side bearing generator)	0.034 or less	0.096	
	$\frac{1}{10,000} \times \text{stroke} \times \alpha$	$\frac{2.8}{10,000} \times \text{stroke} \times \alpha$	
In case of direct connection with flexible coupling:	0.103 or less	0.138	
	$\frac{3}{10,000} \times \text{stroke} \times \alpha$	$\frac{4}{10,000} \times \text{stroke} \times \alpha$	

Note α : Measurement point correction factor = 1.23

- b. Deflection varies depending on the connection method (direct connection or flexible coupling) between the crankshaft and drive equipment, however, usually, the deflection becomes maximum at the crank throw that is closest to the flywheel.

Adjust the drive equipment using the adjusting shim or chock liner, so that the deflection falls within the limited values as shown in the above table.



The deflection of the crankshaft shall be represented by the value when the engine is cold, and when the engine is warm sometimes differ significantly depending on the measurement conditions, be minded not to use the value measured when the engine is warm as standard.

CHAPTER	5	Inspection and Maintenance
ITEM	4.6 DE-18	Inspection and Maintenance: Measuring Crankshaft Deflection

5-4.6 Measuring Crankshaft Deflection



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- b. Before measurement, push the contact piece of the deflection gauge with a finger, and confirm that both the contact piece and dial gauge return to the original positions correctly.
- c. In the case of the marine engine, since the deflection varies according to the loaded cargo conditions, be minded to record the conditions of loaded cargo, draft, temperature, and so on, at the same time.

C. Measuring Deflection

<Measurement procedure>

- (1) Open the indicator valve, and perform turning the crankshaft.

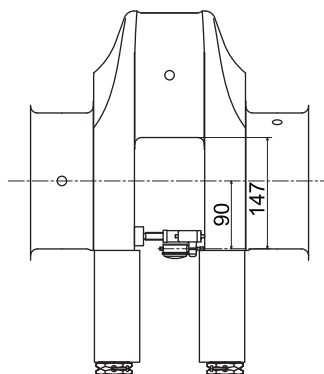
- (2) Place the crank pin at the point of 30° (position "B") past the bottom dead center.

- (3) Install the deflection gauge to the position.

The position is about the same line of the journal outer diameter, and it is a point of intersection of center line in crank arm.

- (4) Set the reading on the gauge scale to +20 at the position "B" in the Figure. (To make clear the positive and negative directions.)

- (5) Slowly turn the engine in the normal direction of rotation, and measure the reading on the scale when the crankshaft is at the angle of "B", "C", "D", "E", and "A" respectively, of which data shall be recorded.



Deflection Gauge Mounting Position

Inspection and Maintenance

Inspection and Maintenance:
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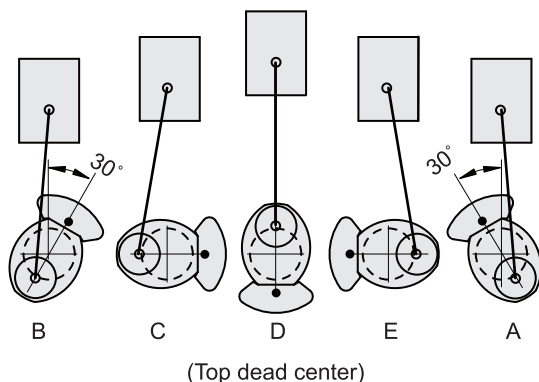
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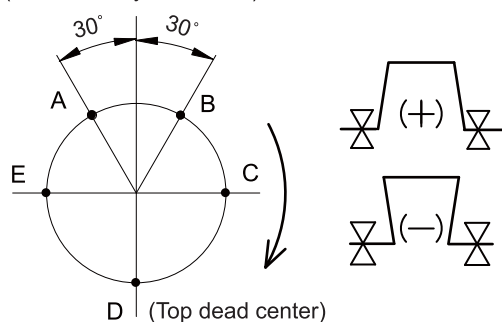
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Deflection Measuring Position

(Seen from flywheel side)



Dial Gauge Reading

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(Unit: mm)

	Adjusted value	Allowable limit	Direction
In case of direct connection: (One-side bearing generator)	0.028 or less	0.078	
	$\frac{1}{10,000} \times \text{stroke}$	$\frac{2.8}{10,000} \times \text{stroke}$	
In case of direct connection: (Both-side bearing generator)	0.028 or less	0.078	
	$\frac{1}{10,000} \times \text{stroke}$	$\frac{2.8}{10,000} \times \text{stroke}$	
In case of direct connection with flexible coupling:	0.084 or less	0.112	
	$\frac{3}{10,000} \times \text{stroke}$	$\frac{4}{10,000} \times \text{stroke}$	

- b. Deflection varies depending on the connection method (direct connection or flexible coupling) between the crankshaft and drive equipment, however, usually, the deflection becomes maximum at the crank throw that is closest to the flywheel.

Adjust the drive equipment using the adjusting shim or chock liner, so that the deflection falls within the limited values as shown in the above table.



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